



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>5</sup> :</b>  <b>B60R 1/08</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 90/12705</b>  <b>(43) International Publication Date:</b> 1 November 1990 (01.11.90)
<b>(21) International Application Number:</b> PCT/GB90/00630 <b>(22) International Filing Date:</b> 24 April 1990 (24.04.90) <b>(30) Priority data:</b> 8909262.1                      24 April 1989 (24.04.89)                      GB <b>(71)(72) Applicant and Inventor:</b> WADE, Stephen, Francis [GB/GB]; 4 Thornden Close, Herne Bay, Kent CT6 7RT (GB). <b>(74) Agent:</b> WRIGHT, Hugh, Ronald; Brookes & Martin, 52/54 High Holborn, London WC1V 6SE (GB). <b>(81) Designated States:</b> AT (European patent), BE (European patent), CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.		<b>Published</b> <i>With international search report.          Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
<b>(54) Title:</b> VEHICLE REAR VIEW APPARATUS  <b>(57) Abstract</b> <p>An optical system comprising a first mirror (13, 14) for mounting adjacent the front (11) of the vehicle in the view of the driver of the vehicle, a second mirror (17) for mounting adjacent the rear corner of the vehicle, the first and second mirrors being of such a form and mounted so that in use, the driver, when looking into the first mirror (13, 14), can see, via the second mirror (17), a view immediately behind the vehicle which is otherwise obstructed by the vehicle itself.</p> <div data-bbox="909 1134 1461 1953"> </div>		

### DESIGNATIONS OF "DE"

Until further notice, any designation of "DE" in any international application whose international filing date is prior to October 3, 1990, shall have effect in the territory of the Federal Republic of Germany with the exception of the territory of the former German Democratic Republic.

#### *FOR THE PURPOSES OF INFORMATION ONLY*

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	ES	Spain	MC	Monaco
AU	Australia	FI	Finland	MG	Madagascar
BB	Barbados	FR	France	ML	Mali
BE	Belgium	GA	Gabon	MR	Mauritania
BF	Burkina Faso	GB	United Kingdom	MW	Malawi
BG	Bulgaria	GR	Greece	NL	Netherlands
BJ	Benin	HU	Hungary	NO	Norway
BR	Brazil	IT	Italy	RO	Romania
CA	Canada	JP	Japan	SD	Sudan
CF	Central African Republic	KP	Democratic People's Republic of Korea	SE	Sweden
CG	Congo	KR	Republic of Korea	SN	Senegal
CH	Switzerland	LI	Liechtenstein	SU	Soviet Union
CM	Cameroon	LK	Sri Lanka	TD	Chad
DE	Germany, Federal Republic of	LU	Luxembourg	TG	Togo
DK	Denmark			US	United States of America

VEHICLE REAR VIEW APPARATUS

The present invention relates to a vehicle rear view apparatus.

5

With many vehicles, particularly vans and lorries, the driver has no clear view of the area immediately behind the vehicle. This is shielded by the van or lorry body. Accidents can occur owing to drivers reversing without  
10 being able to see immediately behind the vehicle.

The present invention provides an optical system for assisting with this problem.

15 The invention provides, according to a first aspect, an optical system comprising a first mirror for mounting adjacent the front of the vehicle in the view of the driver of the vehicle, a second mirror for mounting adjacent the rear corner of the vehicle, the first and  
20 second mirrors being of such a form and mounted so that in use, the driver, when looking into the first mirror, can see, via the second mirror, a view immediately behind the vehicle (which may otherwise be obstructed by the vehicle itself).

25

In order to provide a suitable view, there is provided a suitable curvature of the surface of one or both mirrors.

The second mirror may be mounted to the vehicle by an easily releasable mounting means.

Preferred arrangements of the invention will now be described by way of example only and with reference to the accompanying drawings in which:-

Figure 1 is a front view of a lorry incorporating an optical system of the invention showing first, front, mirrors,

Figure 2 is a rear view of the vehicle showing second, rear mirrors,

Figure 3 is a plan view of the lorry of Figures 1 and 2,

Figure 4 to 7 are respectively, side, front perspective, plan, and underplan views of the second, rear mirror,

Figure 8 is the driver's eye view looking into the first, front mirror,

Figures 9A-9C show the method of mounting the mirrors; and

Figures 10 to 13 correspond to Figures 3 to 6 of a second embodiment of the second, rear, mirror,

Referring to Figures 1 and 2, there is shown a typical lorry 10 comprising a cab 11 and a body 12. Clearly the body 12 obstructs the view immediately behind the vehicle to the driver in the cab 11.

5

We will refer hereafter to the mirrors on one side of the vehicle only, the mirrors on the opposite side being similar.

10 As is clear from Figure 1, there are provided a pair of front mirrors 13,14 mounted on a single bracket 16. The optical system of the invention may simply utilise a conventional mirror, like the lower mirror 14 or a slightly concave, magnifying mirror like the upper mirror  
15 13. Whichever is used, the front, mirror forms a first mirror of the system of the invention. Figure 7 shows the view through the two mirrors; thus the view through the mirror 14 is a conventional rear view and the view through the mirror 13 is apparently enlarged.

20

As is shown in Figure 2, there is also provided on each side of the rear corner of the vehicle a second, rear mirror 17 mounted on a bracket 18. The bracket should be easily removably mounted on a releasable mounting means  
25 or at least pivotable so as to allow the mirror 17 to be removed or pivoted away when the rear doors 19 of the vehicle are open. Figure 3 shows the relative

dispositions of the lorry and mirrors.

One arrangement of mirror 17 is shown in Figures 4 to 7. Figure 4 shows a side view of the mirror, and Figure 5 shows a view of the front reflective surface 21 of the mirror. It will be clearly seen that the mirror 17 has a reflective front surface 21 which is curved. The form of the reflective front surface 21 and the rear housing 22 of the mirror 17 will be clear from Figures 4 to 7 but may be varied as circumstances require.

The mirror 17 is convex and the radius of curvature of the surface of the mirror in a horizontal plane is suitably between 100 and 650mm, and we have found that approximately 250mm is suitable in the circumstances. The radius of curvature in the vertical plane is different and is preferable between 400mm and infinity and we have found that a particularly suitable radius of curvature is 750mm or 1000mm.

We have found that a suitable width of mirror is between 90 and 200mm preferably 120mm and height between 150 and 500mm, preferably 400mm.

The arrangement shown in Figures 10 to 13 is similar, except that the front reflective surface 21 is pitched slightly forwardly, that is the top edge 23 is more

forward than the lower edge 24.

5 It will be understood that because of the curved convex surfaces of the mirror 17, the driver sitting in the cab looking into the mirror 13 will see a view of the mirror 17, and in that mirror 17 he will see a view around the rear of the vehicle. Figure 5 shows an idea of the type of view shown through the mirror 17.

10 The arrangement shown in Figures 10-13 operates in a similar manner to that of Figures 4-7, except that because the reflective surface 21 of the mirror 17 is effectively pitched forward, it shows an area of the ground closer to the mirror around the rear of the  
15 vehicle.

Referring to Figures 9A-C it will be seen that each of the mirrors is mounted to the vehicle in such a manner as to be easily removable. The vehicle mounts upper and  
20 lower sockets 26,27 into which may be mounted a suitably shaped part 28,29 attached to the inner end of the brackets 16.

25 It will be clear that the parts 28,29 of the bracket 16 comprise circular cross section rod, to the ends of which are mounted laterally extending fins 31, 32 and the cross section of the socket 26,27 into which the parts 28,29

fit comprise a central cylindrical part 33 and two opposite extending slots 34,36.

5 In use, therefore, the mirror 17 may be readily mounted to the vehicle body by dropping the parts 28,29 of the brackets 16 into the sockets 26,27, the circular part of the parts 28,29 of the brackets fitting into the cylindrical part 33 and the fins 31,32 fitting into the slots 34,36. In this way the mirror is mounted to the  
10 body in such a manner that it cannot be rotated.

Thus in use, the mirror 17 is mounted to the sockets 26,27 by its bracket 16 and is adjusted until the correct view is provided. That adjustment is carried out by  
15 means of the adjustment nut 37. Thereafter the adjustment nut 37 can be tightly clamped and removing and replacing the mirror is a simple job. When the mirror is replaced by inserting the bracket 16 in the sockets 26,27, one can be assured that the mirror will be  
20 correctly adjusted.

The mirror surface of mirror 17 may be manufactured of glass or plastic suitably coated, and the housing 22 may be made of plastic. The reflective front surface 21 may  
25 be mounted to the housing 22 either permanently or releasable. There may be provided a spring mounting with a flexible gasket between the outer rim of the reflective



front surface 21 and the housing 22 as is well known.

Alternatively one may provide a clip means whereby if the reflective front surface 21 is to be removed, the clip is disengaged and the front surface may be slid out of the housing 22 to be replaced.

To assist in use of the optical system at night, the lorry should be fitted with reversing lights.

It will be understood that the use of two sets of mirrors on each side of the vehicle enables otherwise blind spots to be viewed.

In an alternative arrangement, not illustrated, we provide a smaller version of the mirror which may be mounted to a motor car. The mirror may be removably attached to a mounting means which may be in the form of, for example, a rubber sucker or other removable or permanent mounting means. Thus the mirror may be readily attached to the rear of the vehicle when a difficult reversing parking manoeuvre is to be undertaken.

The invention is not restricted to the details of the foregoing example.

CLAIMS

1. An optical system comprising a first mirror for mounting adjacent the front of the vehicle in the view of the driver of the vehicle, a second mirror for mounting adjacent the rear corner of the vehicle, the first and second mirrors being of such a form and mounted so that in use, the driver, when looking into the first mirror, can see, via the second mirror, a view immediately behind the vehicle which is otherwise obstructed by the vehicle itself.
2. A optical system as claimed in claim 1 characterised in that the surface of the first and/or second mirrors is curved.
3. A optical systems as claimed in claim 1 characterised in that the surface of the second mirror is convex.
4. A optical system as claimed in claim 3 characterised in that the radius of curvature of the second mirror is smaller in a horizontal plane than in a vertical plane.
5. A optical system as claimed in claim 4 characterised in that the radius of curvature of the second mirror in a horizontal plane is between 100 and 650mm.

6. A optical as claimed in claim 5 characterised in that the radius of curvature of the second mirror in the horizontal plane is approximately 250mms.

5 7. An optical system as claimed in any of claims 2 to 6 characterised in that the radius of curvature of the second mirror in the vertical plane is between 400mm and infinity.

10 8. An optical system as claimed in claim 7 characterised in that the radius of curvature of the second mirror in the vertical plane is approximately 750mm.

15 9. An optical system as claimed in any of claims 1 to 8 characterised in that the first mirror is flat.

20 10. An optical system as claimed in any of claims 1 to 9 characterised in that the second mirror is mounted adjacent to the rear corner of the vehicle by an easily releasable mounting means.

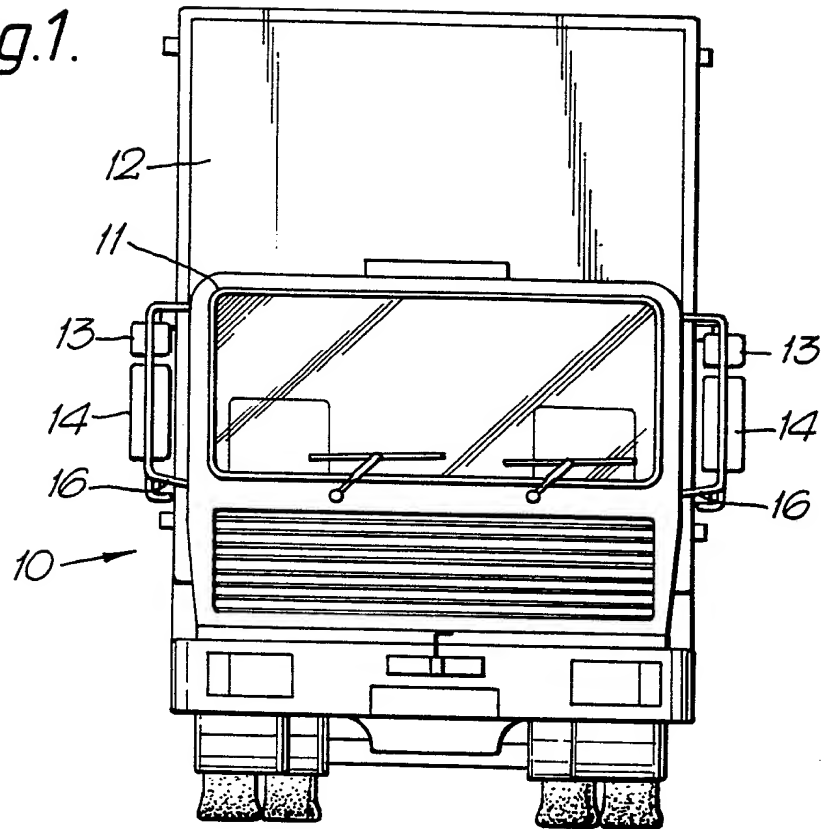
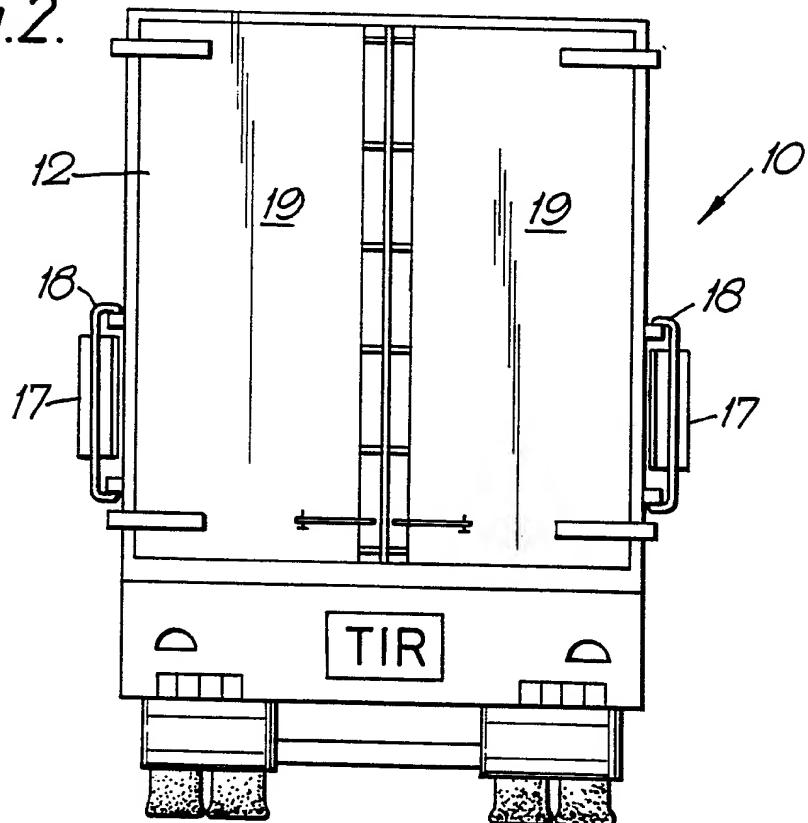
25 11. An optical systems as claimed in claim 10 characterised in that releasable mounting means comprises an arm connected to the second mirror and a socket means, the arm being insertable into the socket means, and the arm and socket means being so shaped relative to each

other as to prevent rotation or movement of the second mirror means.

12. An optical system as claimed in claim 11  
5 characterised in that said socket means has a vertical axis.

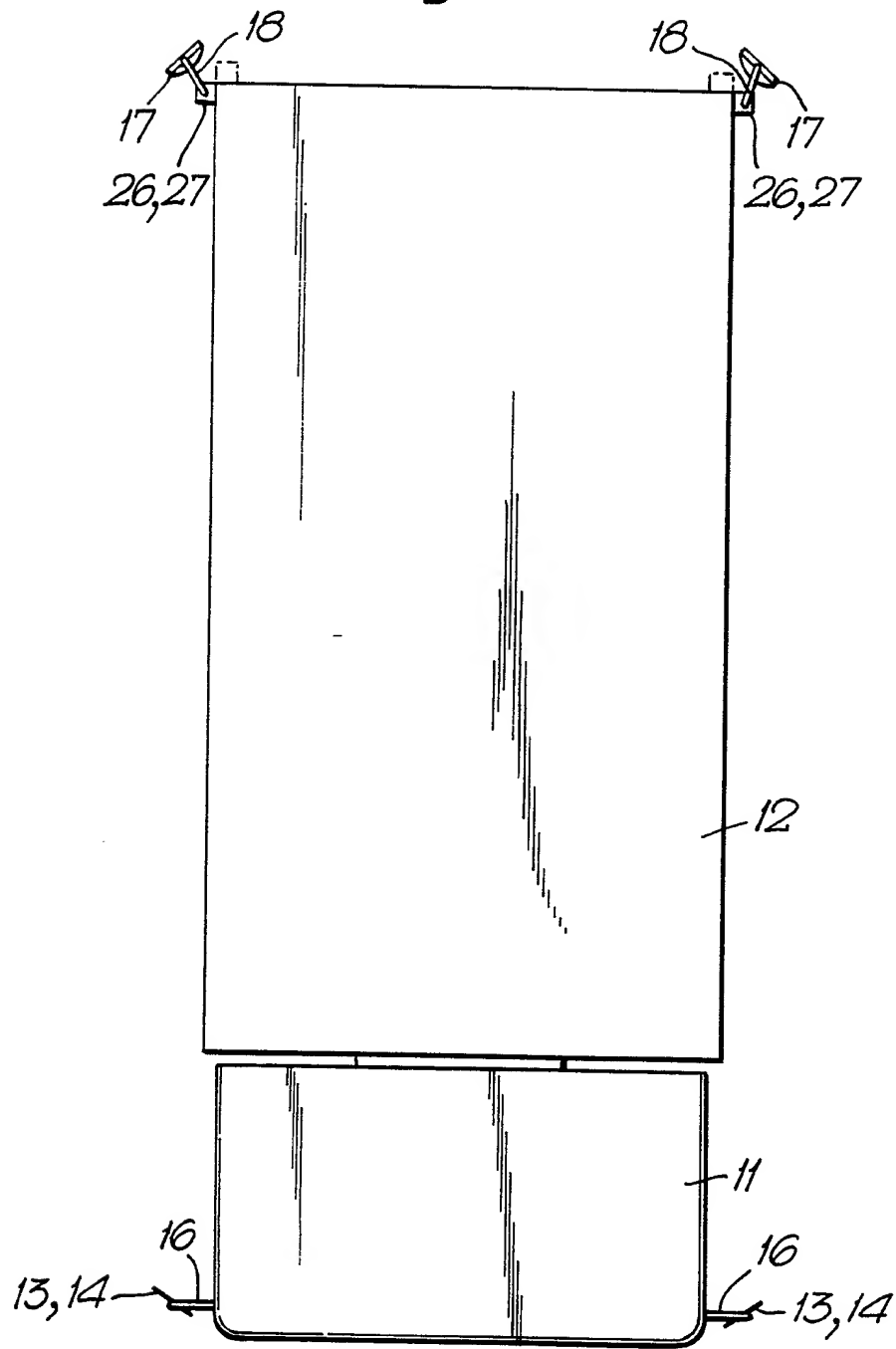
13. An optical system as claimed in claim 11 or 12  
10 characterised in that said arm is of circular cross section with laterally extending fins.

14. An optical system as claimed in any of claims 10 to  
13 characterised in that said second mirror is mounted by  
15 two substantially identical mounting means, disposed respectively at or adjacent the top and bottom of the second mirror.

$\frac{1}{5}$ *Fig.1.**Fig.2.*

2/5

Fig. 3.



3/5

Fig. 4.

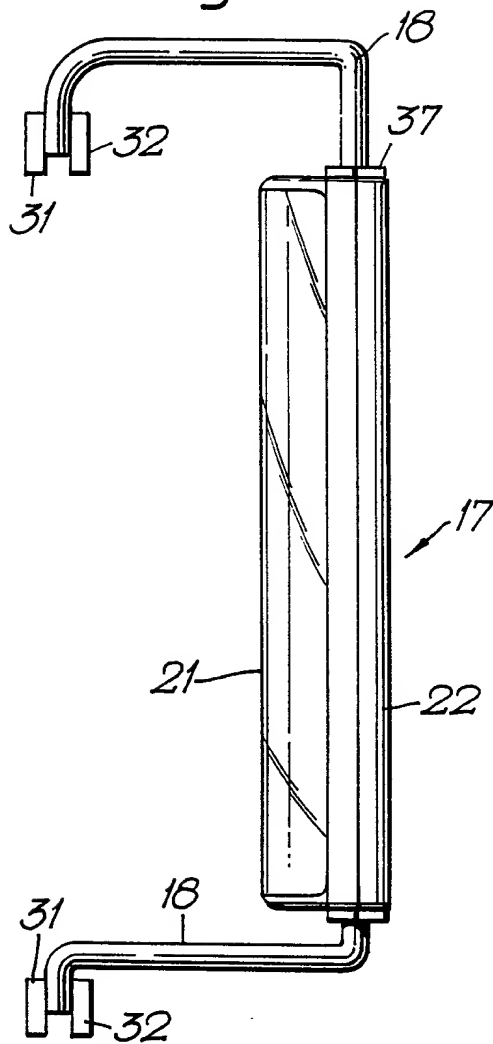


Fig. 5.

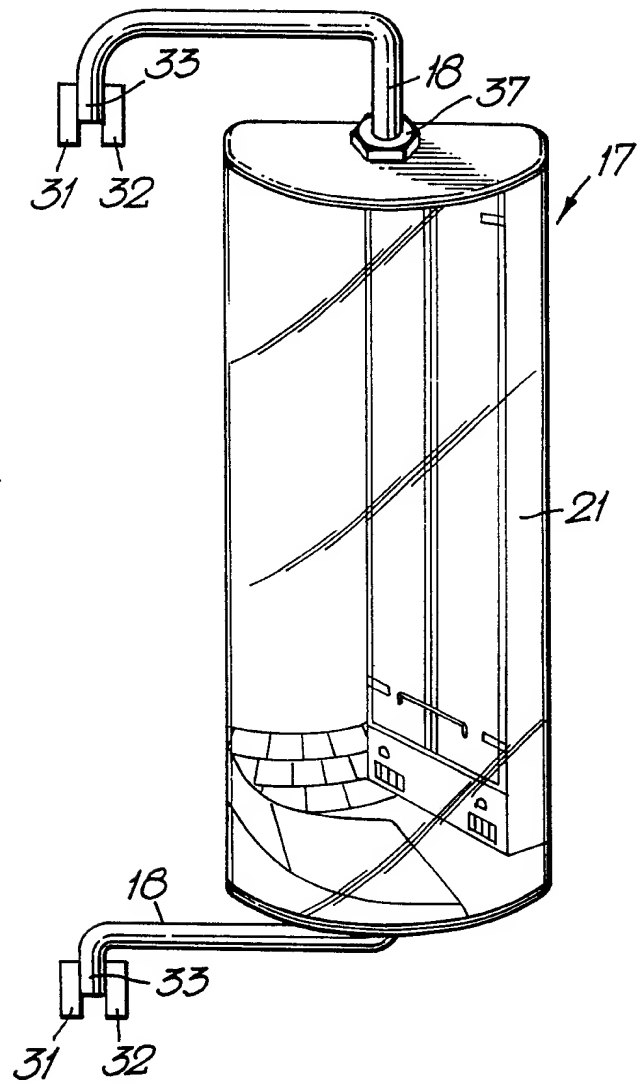


Fig. 6.

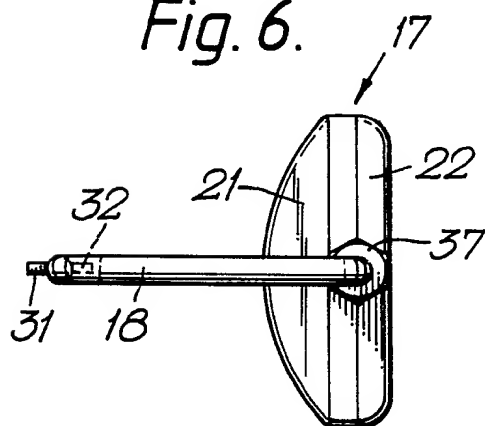
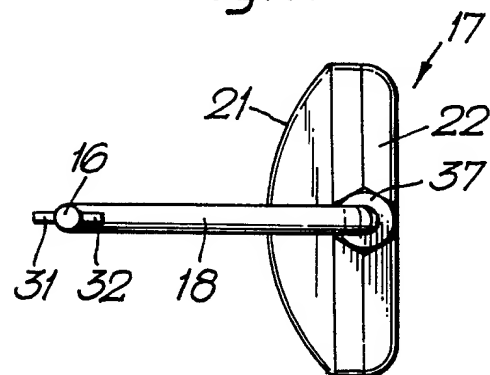


Fig. 7.



4/5

Fig. 8.

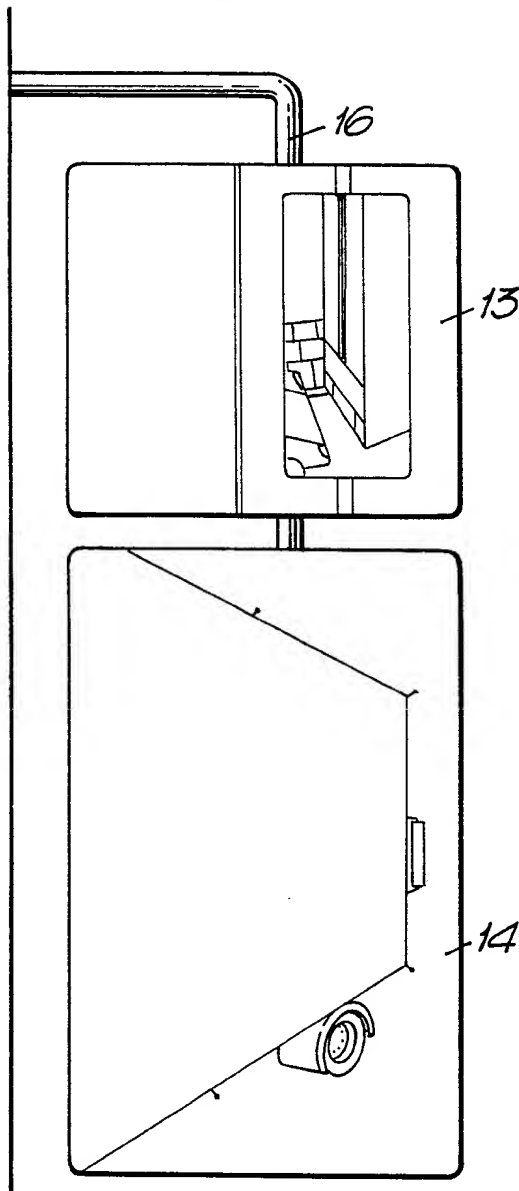


Fig. 9A.

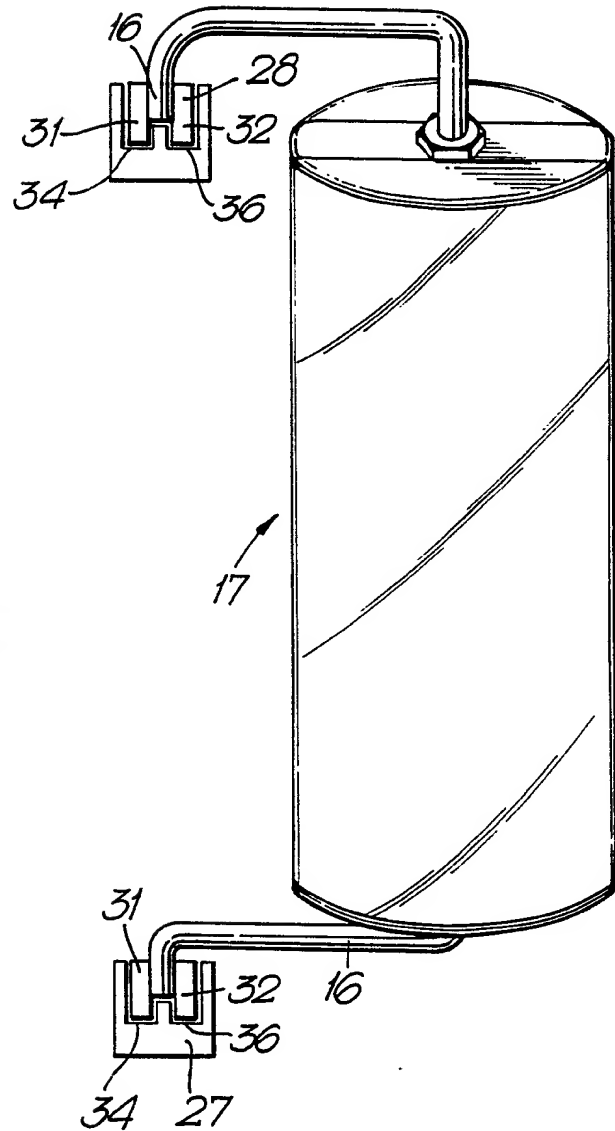


Fig. 9C.

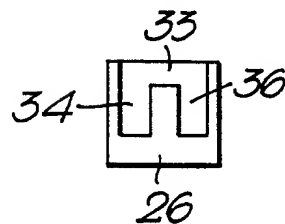
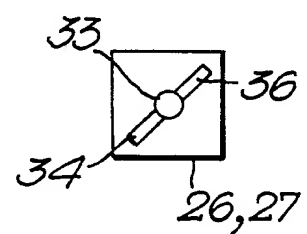


Fig. 9B.





5/5

Fig.10

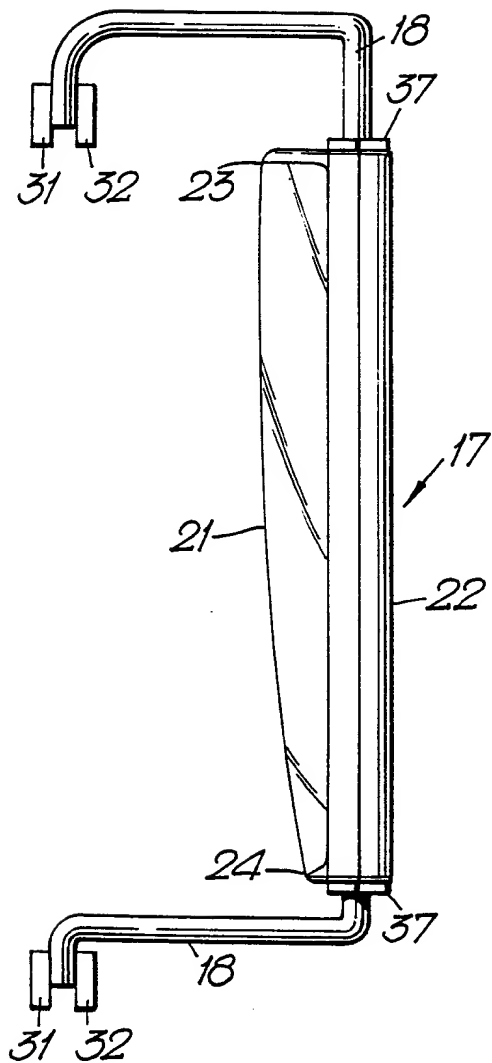


Fig.11.

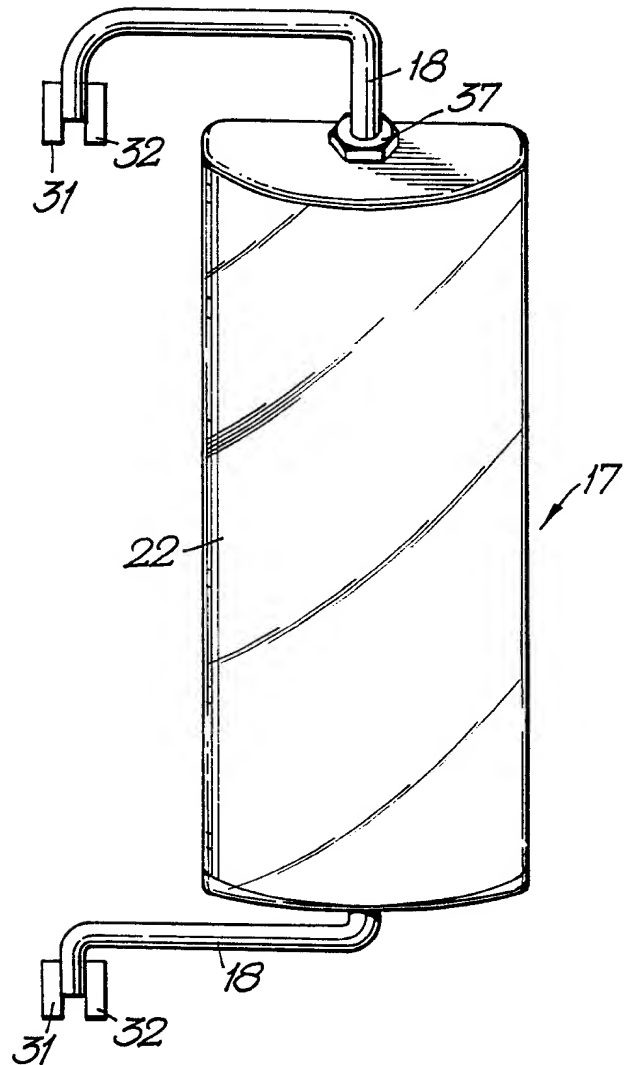


Fig.12.

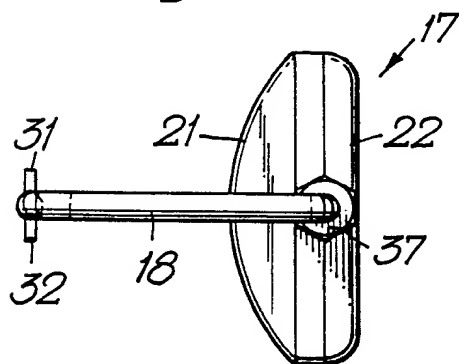
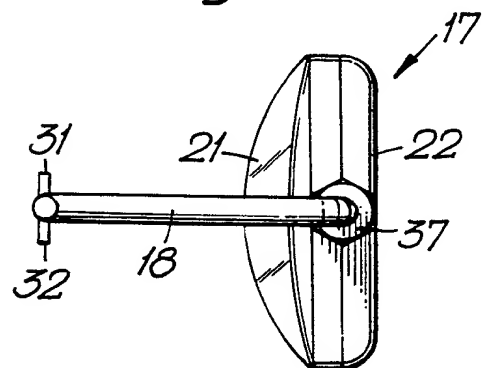



Fig.13.



## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 90/00630

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 5                      B60R1/08		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int.Cl. 5	B60R	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	PATENT ABSTRACTS OF JAPAN vol. 1, no. 23 (M-76)(1814) 25 March 1977, & JP-A-51 137237 (SEISHIN OKUDA) 27 November 1976, see the whole document	1-3
Y	---	4
Y	US,A,3901587 (HAILE) 26 August 1975 see column 1, line 18 - column 3, line 21; figures 1-3	4
X	---	
X	PATENT ABSTRACTS OF JAPAN vol. 10, no. 115 (M-474)(2172) 30 April 1986, & JP-A-60 244643 (TOUKAI RIKADENKISEISAKUSHO K.K.) 04 December 1985, see the whole document	1-3, 9
X	---	
	GB,A,2085382 (DAVID BRIERLEY) 28 April 1982 see page 1, lines 1 - 104; figures 1-3	1, 9
	---	
	-/--	
<sup>10</sup> Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such docu- ments, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
31 JULY 1990	28. 08. 90	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	D'SYLVA C. 	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED) FROM THE SECOND SHEET		
Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X	US,A,4469405 (CHIN-WUN) 04 September 1984 see abstract; figure 3 see column 3, line 28 - column 4, line 6 ---	1-3, 9
A	DE,A,3328432 (KRAAS PETER) 21 February 1985 see page 3, line 1 - page 18 see page 13, line 26 - page 14, line 22 see figures 1-3 ---	10-14

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO. PCT/GB 90/00630**

SA 36555

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

31/07/90

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-3901587	26-08-75	None	
GB-A-2085382	28-04-82	None	
US-A-4469405	04-09-84	None	
DE-A-3328432	21-02-85	None	

**PUB-NO:** WO009012705A1  
**DOCUMENT-IDENTIFIER:** WO 9012705 A1  
**TITLE:** VEHICLE REAR VIEW APPARATUS  
**PUBN-DATE:** November 1, 1990

**INVENTOR-INFORMATION:**

<b>NAME</b>	<b>COUNTRY</b>
WADE, STEPHEN FRANCIS	GB

**ASSIGNEE-INFORMATION:**

<b>NAME</b>	<b>COUNTRY</b>
WADE STEPHEN FRANCIS	GB

**APPL-NO:** GB09000630

**APPL-DATE:** April 24, 1990

**PRIORITY-DATA:** GB08909262A (April 24, 1989)

**INT-CL (IPC):** B60R001/08

**EUR-CL (EPC):** B60R001/00

**US-CL-CURRENT:** 359/844

**ABSTRACT:**

An optical system comprising a first mirror (13, 14) for mounting adjacent the front (11) of the vehicle in the view of the driver of the vehicle, a second mirror (17) for mounting adjacent the rear corner of the vehicle, the first and second mirrors being of such a form and mounted so that in use, the driver, when looking into the first mirror (13, 14), can see, via the second mirror (17), a view immediately behind the vehicle which is otherwise obstructed by the vehicle itself.